



HUMMING HOME



MONASH SUSTAINABLE BUILDINGS (MSB)

2023 Design Challenge - New Housing Division | Final Presentation



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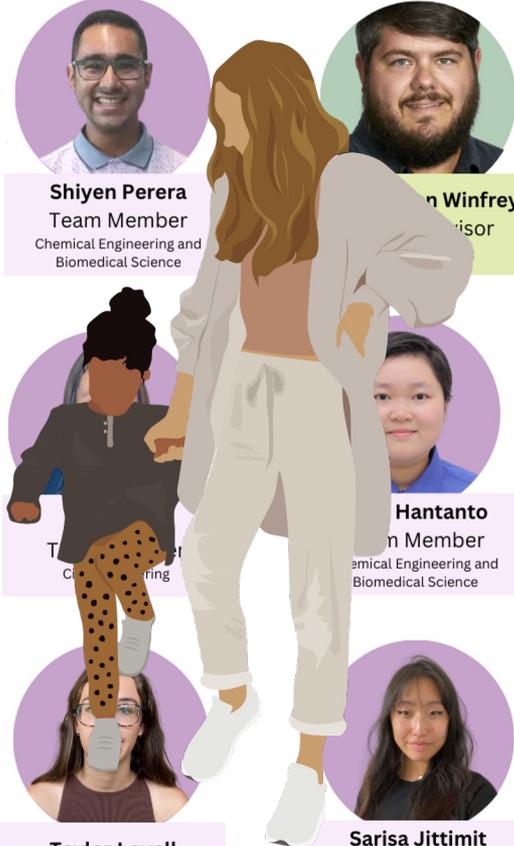
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Team Member
Mechanical Engineering and
Commerce



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Team Member
Civil Engineering and Science



We are Monash Sustainable Buildings (MSB) - a student team based at Monash University in Victoria, Australia, with a passion for tackling real-world problems and sustainable building design.

- 1 of 108,000 homeless victims of family violence in Australia (Australian Institute of Health and Welfare)

- 29 year old single mother with a 6 year old daughter

- Financially unstable
- Recovering from an abusive partner



NARRATIVE / CONTEXT

The Domestic Violence (DV) Crisis

"In Victoria, domestic violence is the leading cause of homelessness for women and children."

- AIHW homelessness services annual report



1 in 6 women have experienced physical or sexual violence by a current or former partner

Mission Australia



On average, it takes **7** attempts for women to escape abusive conditions.

National Domestic Violence Hotline



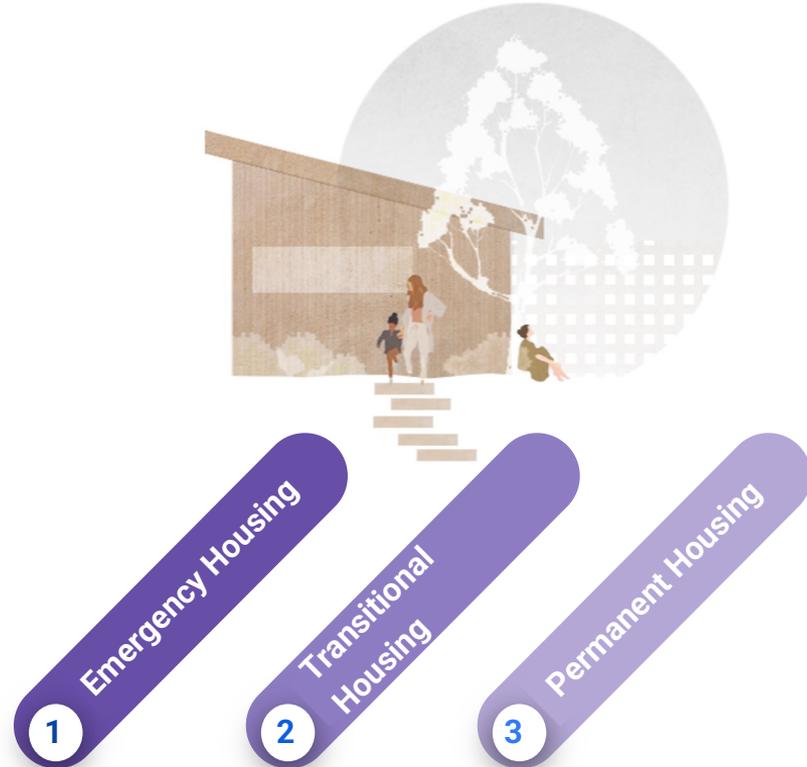
Over **90%** of first request by DV survivors to Specialist Homelessness Services for long-term accommodation were unable to be met.

AIHW 2016



Around **62%** of Australians reported being abused or neglected in childhood

Medical Journal of Australia



DISCUSSION OF TARGET MARKET



Women



Children



First
Australians



People with
disability

“Women with disability are almost 40 per cent more likely to experience family violence than other women.”

ABS Personal Safety Survey

Location	Melbourne, Australia
Client Demographic	Single woman with up to 2 children
Household Income	Low income Women who earn less than their partners
At-risk Groups	Aboriginal and Torres Strait Islander women Young/Pregnant women Women with disabilities People exposed to violence as children Older women

Our Partners

Kara
family violence service

Kara House provides safety, support and education for women and children impacted by family violence.

Kara House website



LIGHTHOUSE
FOUNDATION *for youth*

The Lighthouse foundation supports kids experiencing homelessness or trauma through helping them to heal, grow, and achieve a lifelong sense of belonging.

The Lighthouse Foundation website



SITE SELECTION



The site was chosen based on the following criteria:



Land Price

Land price is **40% cheaper** than the rest of Melbourne.



Crime Rate

Crime rate is **40% lower** than the rest of Melbourne.



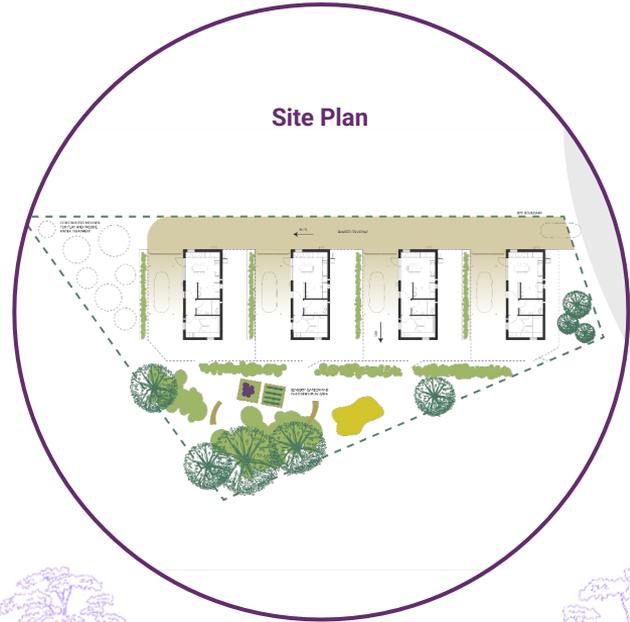
Amenities

Shop, hospital, and schools within **5 minutes** drive.

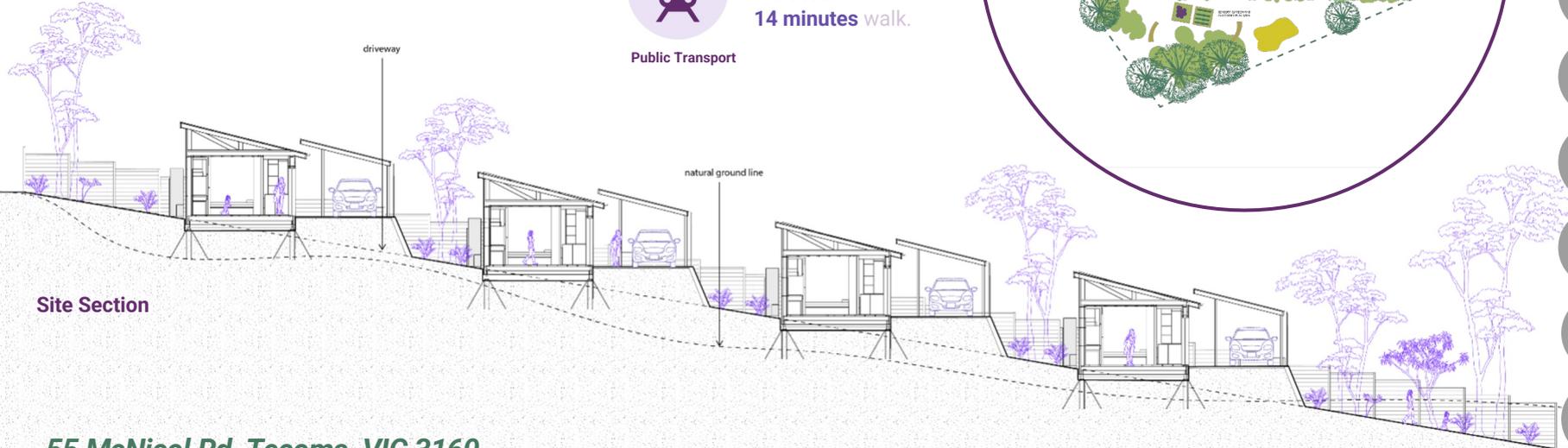


Public Transport

Train station is **2 minutes** drive or **14 minutes** walk.



Site Plan



Site Section

55 McNicol Rd, Tecoma, VIC 3160



Architecture



Engineering



Market Analysis



Durability and Resilience



Embodied Environmental Impact



Integrated Performance



Occupant Experience



Comfort and Environmental Quality



Energy Performance



SITE VISIT

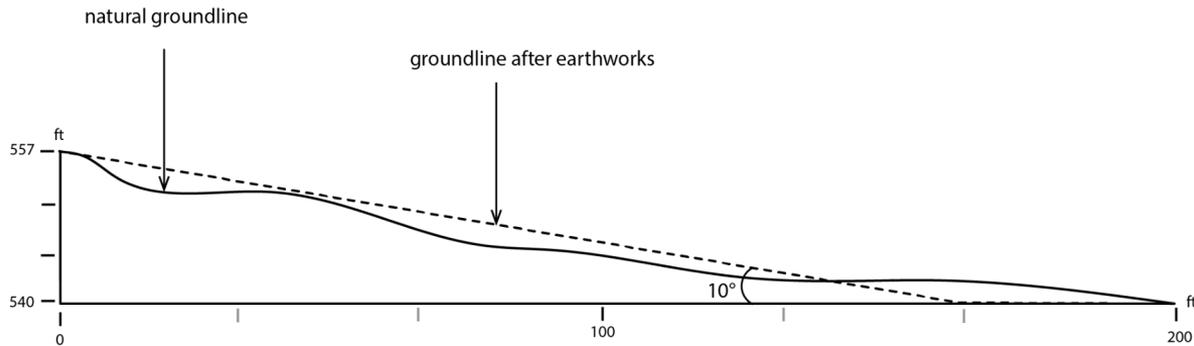
Site Photos:



View of incline from back of site



Creek located at Northern end of site





Recovery



Sense of safety



Privacy



Climate resilience



Energy efficiency





DESIGN

FLOOR PLAN



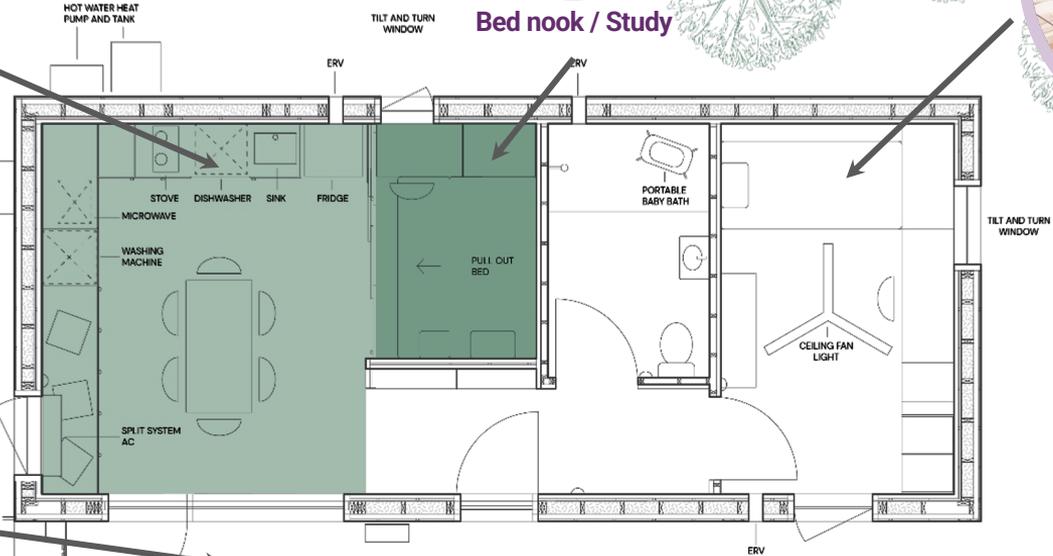
Kitchen



Bed nook / Study



Bedroom



Carport



Backyard

- A** Architecture
- E** Engineering
- MA** Market Analysis
- DR** Durability and Resilience
- E EI** Embodied Environmental Impact
- IP** Integrated Performance
- OE** Occupant Experience
- CEQ** Comfort and Environmental Quality
- EP** Energy Performance

SITE PLAN



A
Architecture

E
Engineering

MA
Market
Analysis

DR
Durability and
Resilience

E EI
Embodied
Environmental
Impact

IP
Integrated
Performance

OE
Occupant
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Performance



INDOOR LIGHTING SHOWCASE



**Dawn/dusk
mode**



**Daylight
mode**

SENSORY GARDEN



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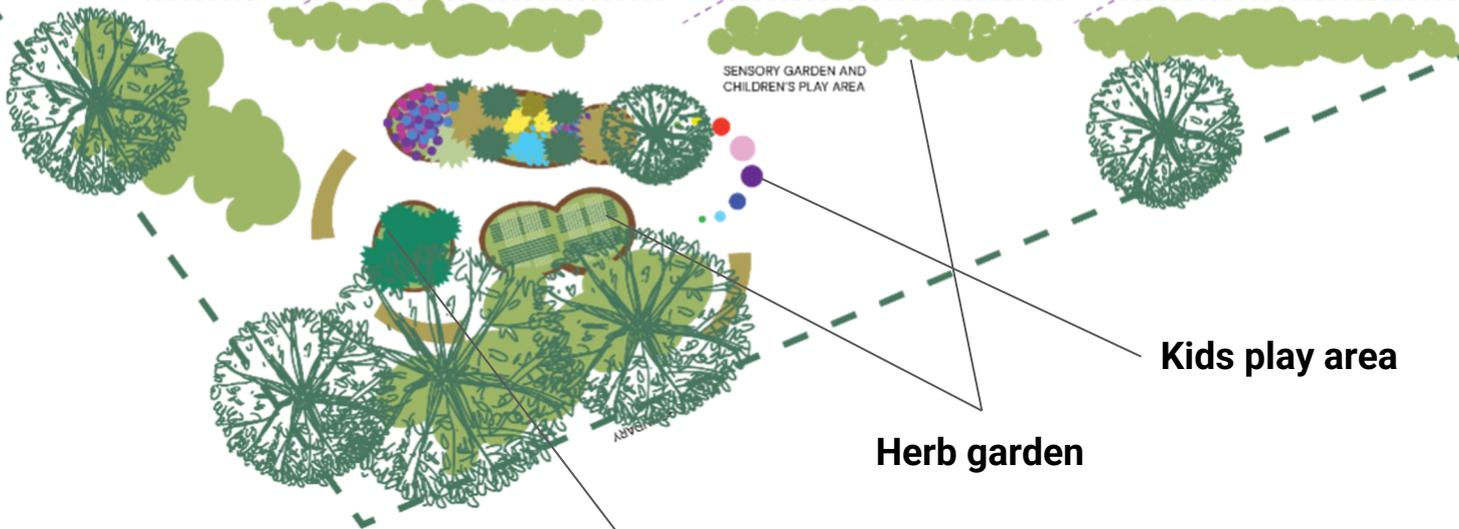
OE
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Mounds



SENSORY GARDEN AND CHILDREN'S PLAY AREA

Kids play area

Herb garden

Communal space

Fire risk:

- Highest natural disaster death toll
- Over a 100,000 annual fires



Tecoma:

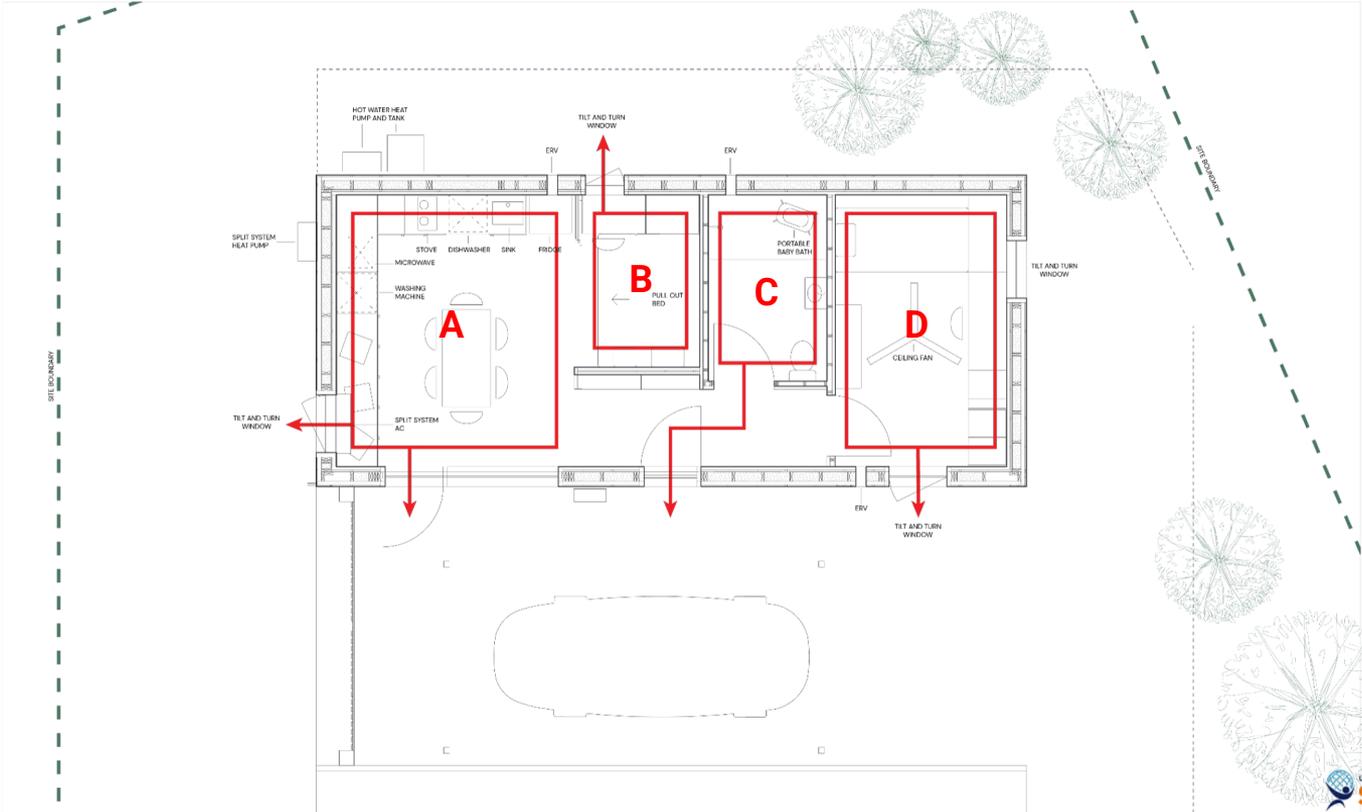
- Very high to extreme fire risk
- Ember spreading
- Heat and smoke



ESCAPE ROUTES



Individual dwelling routes:



A
Architecture

E
Engineering

MA
Market Analysis

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Durability and Resilience

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OE
Occupant Experience

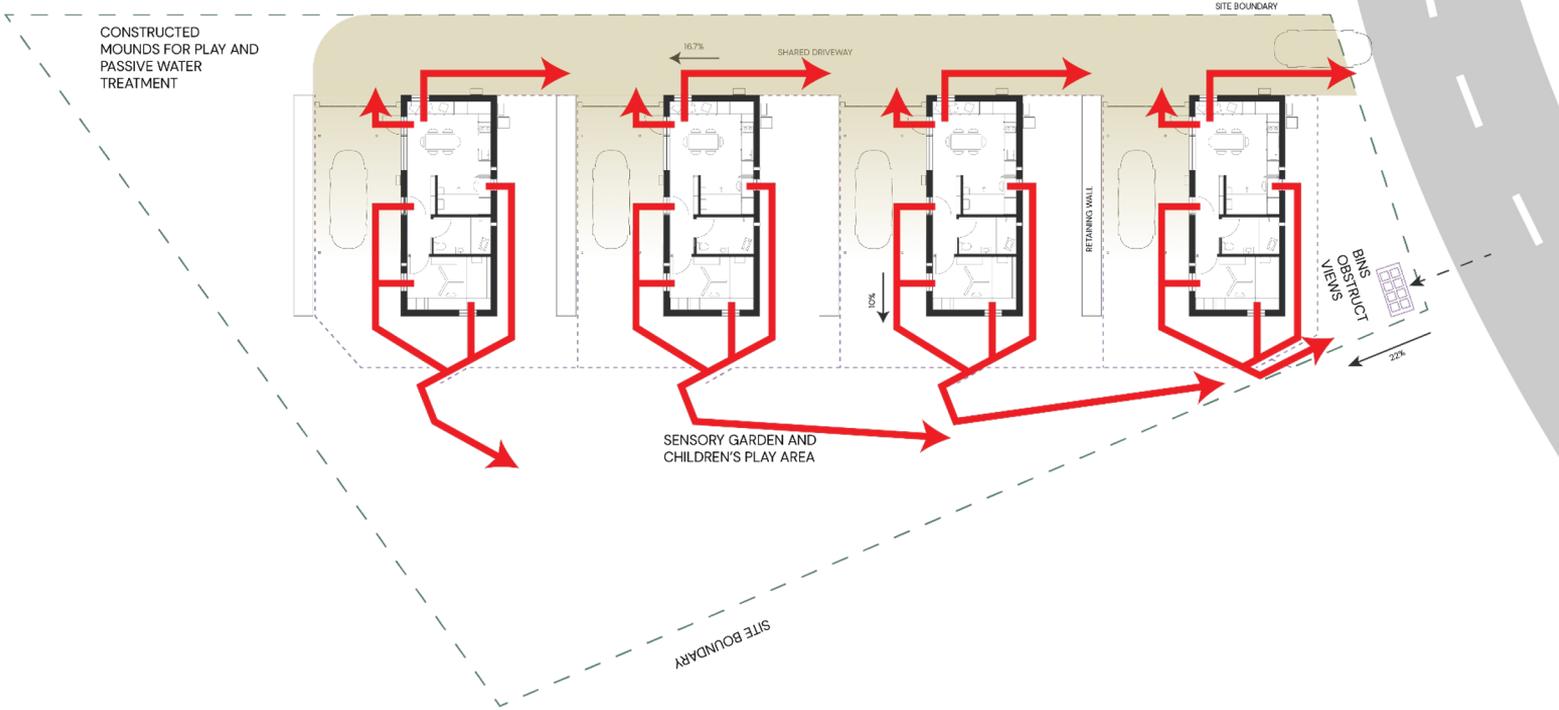
CEQ
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ESCAPE ROUTES



Site routes:



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SYSTEMS, ENERGY & ENGINEERING

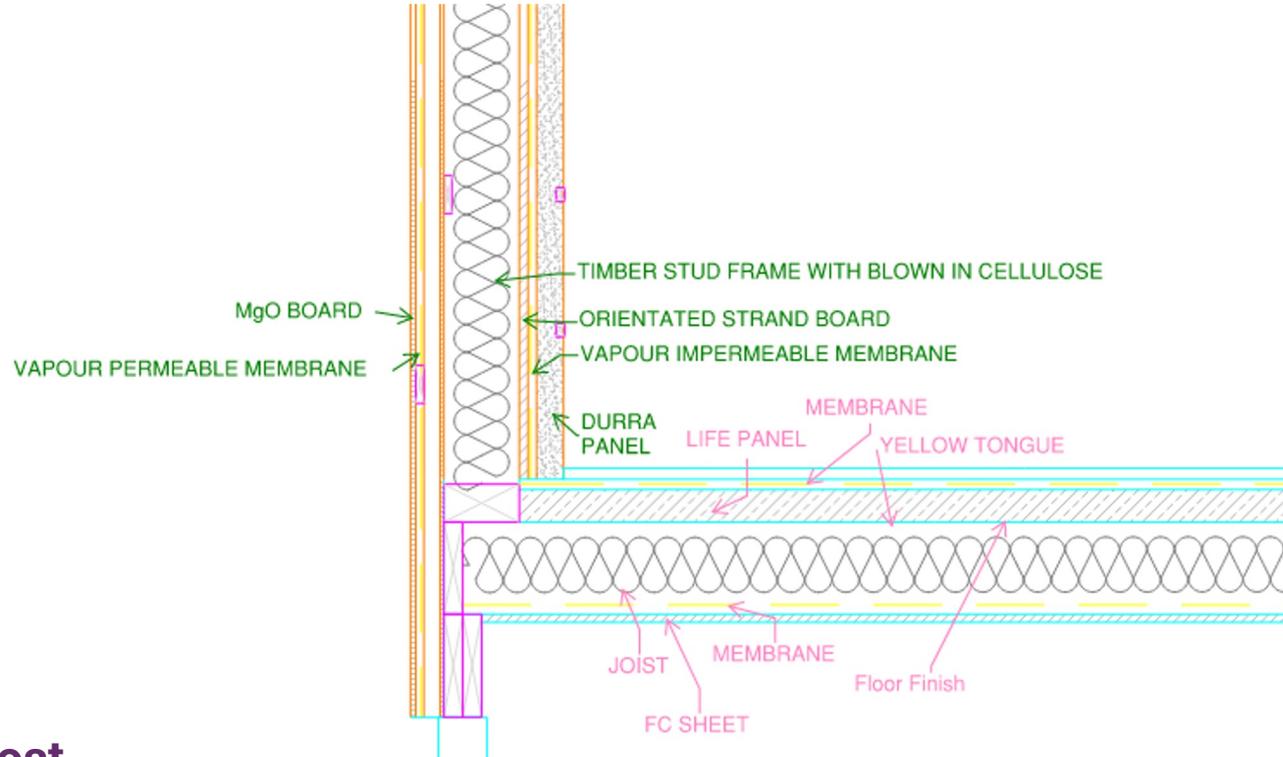
MATERIAL SELECTION



MgO Board



Durrapanel

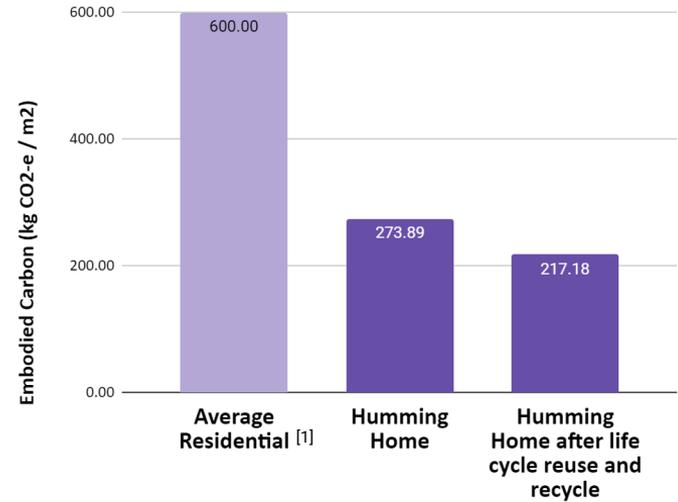
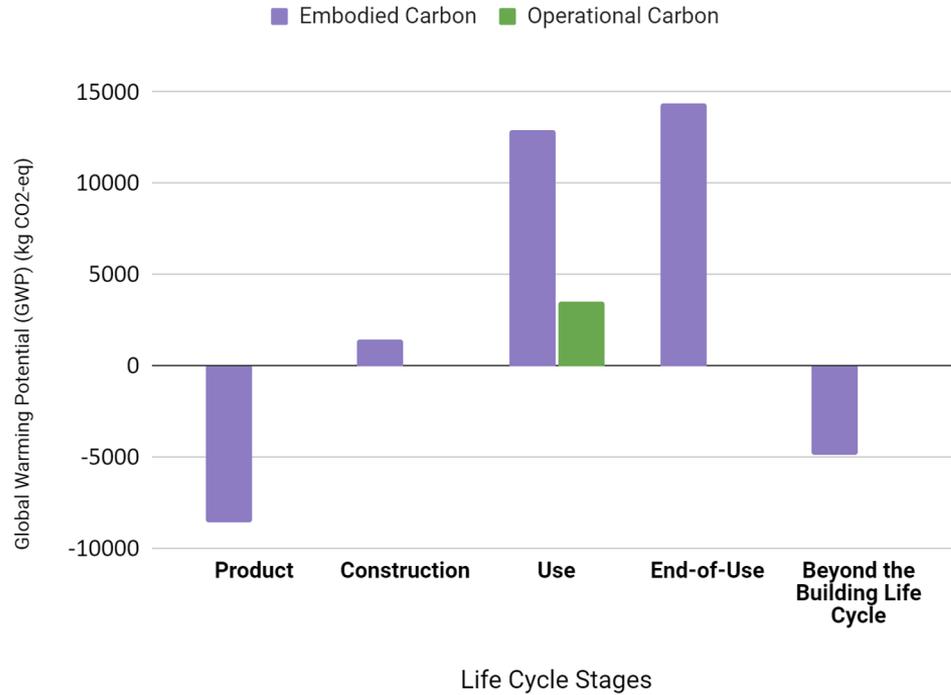


Total Material Cost

\$99,000 USD



LIFE CYCLE ANALYSIS



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Durability and Resilience

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Embodied Environmental Impact

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Integrated Performance

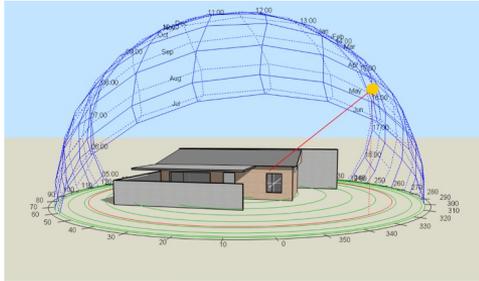
OE
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[1] ([Share Your Green Design](#))

ENERGY - MODELLING AND PV SYSTEM



**2kW PV Array
Jinko**



**10kWh Battery
Redflow ZBM3**

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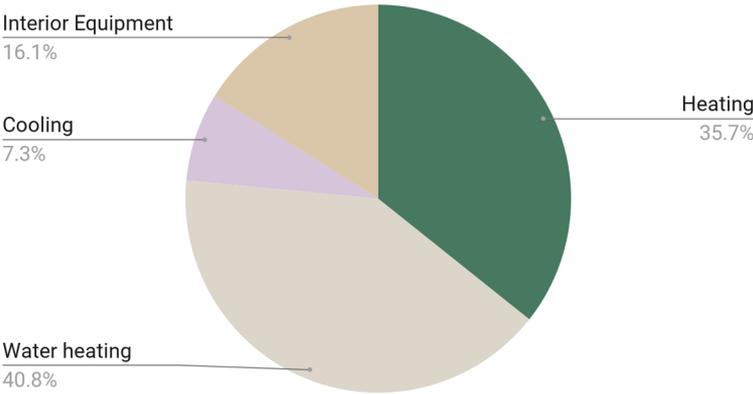
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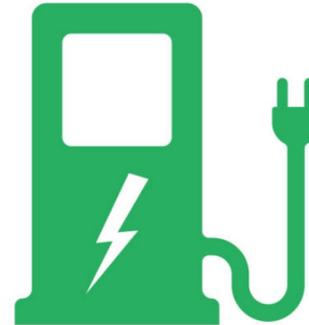
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Net Site Energy: 1352 kWh



Excess energy to be stored into battery, providing **20-25 kms (12.4-15.5mi) of range per day**

ERV



LAROS LUNOS e2-60

42 dB

11 BTU/h

96% efficient

Air Conditioner



MITSUBISHI SRK20ZSXA-
W

Cooling: indoor 38dB,
outdoor 56dB

Heating: indoor 38dB,
outdoor 58dB

Refrigerant R32

Recirculating

Rangehood



Everdue RUE512

51-57 dB

3 speed settings

Ducted undermount

Hot water system



RECLAIM REHP-CO2-
315SST ENERGY HEAT
PUMP

37 dB

CO2 refrigerant

COP of 5

Designed to use excess PV
generation

Light/fan



48" Fanco Eco Silent DC
Ceiling Fan with LED Light

Designed to be quiet

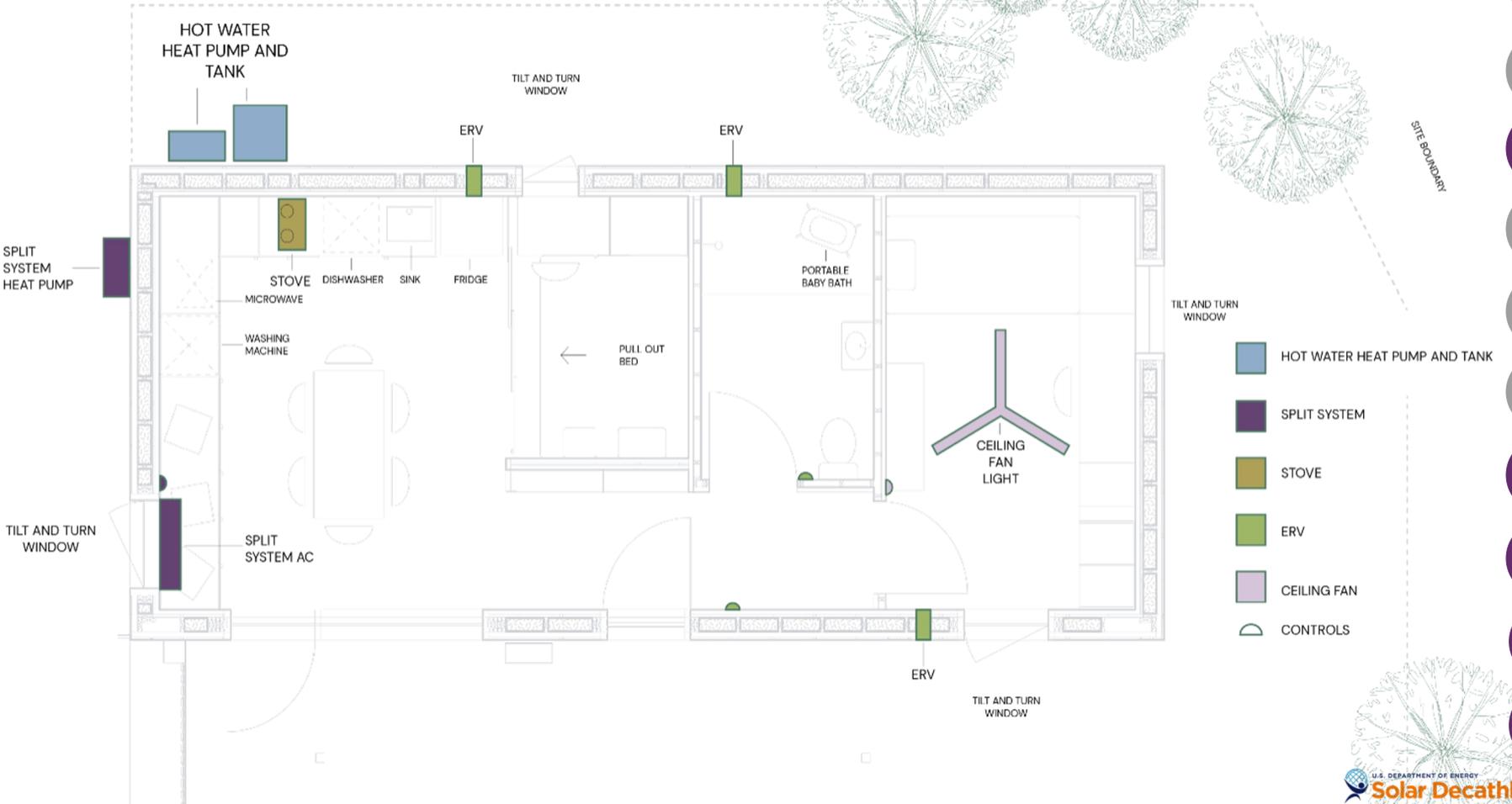
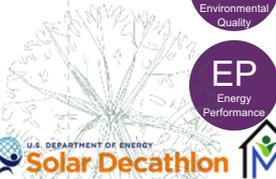
Fan performance ranges
from 12 - 66 BTU/h

6 speed settings ranging
from 60 - 215 rotations per
minute

SYSTEMS SELECTION - HVAC



SITE BOUNDARY



Oven



BOSCH SERIE | 8 BUILT-IN OVEN 60X60CM BLACK

2969 BTU/cycle (energy consumed per cycle conventional)

Inside surface breaks down grease during oven operation

Fridge



LIEBHERR 350L STAINLESS STEEL-BOTTOM MOUNT - CNEF4315

Relatively quiet

Energy rating: 5.5 stars (out of 6)

Humidity control to extend the life of fruit and vegetables

Dishwasher



OMEGA 60CM DOUBLE DRAWER DISHWASHER

Energy rating: 3.5 stars (467463 BTU/365 washes)

Water rating: 4.5 stars (1.7 gallons per wash)

47 dB

Washing machine



LG 7.5KG FRONT LOAD WASHER

Quiet mechanism

Energy rating: 4.5 stars

Water rating: 4 stars (20 gallons)

Connects to internet



“We will no longer allow family violence to be hidden behind closed doors. Each of us has a role to play in bringing it to an end.”

- Gabrielle Williams, Minister for Prevention of Family Violence